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RASSROOTS INNOVATIONS TO TECHNO- ENTREPRENEURSHIP THROUGH GIAN – TECHNOLOGY BUSINESS INCUBATOR IN INDIA: A CASE STUDY OF NATURE TECHNOCRATS

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ABSTRACT

Entrepreneurship is the solution to solve a problem of unemployment in any economy. Normally, we think of Technology innovations, we think of Engineers from top Technology Institutions. But innovations may also come from Grassroots people. This paper gives the Case study of Nature Technocrats – small business firm of Arvindbhai who has been supported by GIAN (Grassroots Innovations Augmentation Network), Technology Business Incubator for Grassroots Innovations in India. In India, there are many Technology Business Incubation centers but approach of GIAN is unique as it supports Grassroots innovators. This paper has come out of a larger study with Research design: Multiple Embedded Descriptive Case Study. The process of GIAN with unique mechanism of commercializing the Grassroots innovations is described. The problems in this area are also described. This case study may inspire other agencies in India or other countries too for working in the area of Grassroots innovations to Techno-entrepreneurship.

Key words: Grassroots innovations, Technology innovations, Techno-Entrepreneurship, GIAN, Technology Transfer

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Principal Topic

Entrepreneurship is one of the solutions to solve a problem of unemployment in any economy. There are many mechanisms to support Entrepreneurship. Technology Business Incubation is one of the most important mechanisms to support Techno-entrepreneurship. There are many Technology innovations but the matter of concern is how many Techno-innovations can be converted in to Techno – Entrepreneurship. Technology Innovation is important and difficult but Entrepreneurship is not just about Technology Innovation. Techno – Entrepreneurship is a broad concept and involves many things and not just Technology Innovation. Technology Entrepreneur is one who organizes, manages and assumes the risk of an technology based business enterprise (Nicholas S.P. & Armstrong N.E., 2003). Successful entrepreneur has to have managerial skills to utilize resource effectively, should be able to make appropriate feasibility analysis, should have skills related to Marketing, Human Resource management, Financial management, Manufacturing management and Networks. For all these aspects, Technology Business Incubation is a mechanism which can provide total support. Not only can an incubator increase local employment opportunities, it can also diversify the local economic base and enhance the local image as a center for business activity.

Normally, we think of Technology innovations, we think of Engineers from top Technology Institutions. But innovations may also come from Grassroots people. In the 21st Century, we have to support Grassroots innovations also for overall growth of any economy. This paper gives the Case study of Nature Technocrats – small business firm of Arvindbhai who has been supported by GIAN (Grassroots Innovations Augmentation Network), Technology Business Incubator for Grassroots Innovations in India. In India, there are many Technology Business Incubation centers but approach of GIAN is unique as it supports Grassroots innovators. GIAN is India's first technology business incubator focused on incubating and commercializing Grassroots innovations in India. Grassroots innovations are essentially solutions generated by people at the grassroots levels to tide over persistent problems, the solutions to which are either not available or not affordable by a large section of the consumer

masses in developing countries like India. The problem for GIAN is: How to motivate Grassroots person to be an entrepreneur who comes out with great innovations? They lack in soft skills related to business because of their poor educational background. Most of the time, they have to go for the Technology Transfer rather than making them real entrepreneur.

Methodology

This paper has come out of a larger study with Research design: Multiple Embedded Descriptive Case Study. This is one of the case studies out of total four case studies made to study: Techno-innovations to Techno-Entrepreneurship through Technology Business Incubation in India. Data have been collected through in-depth personal interviews in the starting by making the case format with major focus area and minor focus area. Afterwards if required, follow up interviews have been conducted through telephone and email also. The extensive literature review was conducted to support the research which has been useful at the time of analyzing data too. With the help of the literature review conducted, the conceptual framework for data analysis was constructed which has acted as a pattern for the pattern matching in data analysis as suggested as a one of the technique to analyze case study by Yin R. K. (2003).

Results and implications

With help of data analysis and findings, we could study the components of the Technology Business Incubation in the present case which normally deal with Grassroots innovations to Techno-entrepreneurship. We could describe the process of GIAN with unique mechanism of commercializing the Grassroots innovations either by Techno-entrepreneurship or by Technology Transfer. This case study will also describe the problems in this area and some suggestions have also been made for the same. All these will be very useful and will definitely encourage other developing economies in the world. This may also inspire other agencies in India or other countries too for working in the area of Grassroots innovations to Techno-entrepreneurship.



1. INTRODUCTION

Entrepreneurship is the solution to solve a problem of unemployment in any economy. Normally, we think of Technology innovations, we think of Engineers from top Technology Institutions. But innovations may also come from Grassroots people. This paper gives the Case study of Nature Technocrats – small business firm of Arvindbhai who has been supported by GIAN (Grassroots Innovations Augmentation Network), Technology Business Incubator for Grassroots Innovations in India. Various Government and Non Government agencies are doing lot of work to promote Entrepreneurship in India. Particularly Government of India is doing great work to promote Techno – Entrepreneurship by providing support through various agencies under the umbrella of Department of Science and Technology (DST). Even it has established National Science and Technology Entrepreneurship Development Board under DST. In India, there are many Technology Business Incubation centers but approach of GIAN is unique as it supports Grassroots innovators.

2. TECHNO – INNOVATIONS TO TECHNO-ENTREPRENEURSHIP

Innovation is the introduction of new ideas, goods, services and practices which are intended to be useful. The main driver for innovation is often the courage and energy to better the world. An essential element for innovation is its application in a commercially successful way. Innovation has punctuated and changed human history. But many times innovation dies because of lack of support. Many engineering students are doing so many innovative things but most of the time, they end up as a certificate on a piece of paper as they do not find any support to commercialize their ideas. Not only engineering students but even innovations have come from the Grassroots people without any technology educational back ground. National Innovation Foundation (NIF), Honey Bee Network, SRISTI etc. supported them in India. An innovator can be a member of Honey Bee Network. It works in knowledge mapping and gathering, knowledge creation and value addition & knowledge application and dissemination (Gupta A, 2006).

Important thing is: How to convert Techno – Innovation in to Techno – Entrepreneurship? There are many Technology innovations but the matter of concern is how many Techno-innovations can be converted in to Techno – Entrepreneurship. Technology Innovation is important and difficult

but Entrepreneurship is not just about Technology Innovation. Techno – Entrepreneurship is a broad concept and involves many things and not just Technology Innovation. Technology Entrepreneur is one who organizes, manages and assumes the risk of an technology based business enterprise (Nicholas S.P. & Armstrong N.E., 2003). For Entrepreneurship, innovation in term of product development may require but it is not just enough as Entrepreneurship is not just all about innovation but also managing many other aspects of business. Successful entrepreneur has to have managerial skills to utilize resource effectively, should be able to make appropriate feasibility analysis, should have skills related to Marketing, Human Resource management, Financial management, Manufacturing management and Networks.

2.2 TECHNOLOGY BUSINESS INCUBATION

Technology Business Incubation involves the commercialization of science and technology through newer community institutional arrangements which can be thought of as technology venturing. It concentrates on alliances as an economic development strategy. Technology venturing is based on creative and innovative ways of linking public sector initiatives and private sector resources within and across regional and national boundaries for promoting economic growth. Technology Business Incubation can foster corporate and community collaborative efforts, while nurturing positive government-academic-business relationships. Technology venturing activities within a community are based on linking four critical factors: (1) talent – people, (2) technology – ideas, (3) capital – resources and (4) know-how – knowledge. Support for each factor includes: Expanding talent pool, accelerating the transfer of technology, increasing availability of capital and Improving availability of managerial, technical and business know-how. The primary drivers of technology business incubation are entrepreneurs – people who make things happen and technologies or ideas that have potential to be commercialized within a reasonable period of time (Tornatzky L.G., Batts Y., McCrear N.E., Lewis M.S. & Quittman L.M. (1996). There is growing realization that the community at large also benefits from small business incubators.

Not only can incubator increase local employment opportunities, it can also diversify the local economic base and enhance the local image as a center for business activity. But in future incubation centers may tend to be organized ‘for profit’, as public source of funding are stretched to their limits (Gatewood B., Ogden L. and Hoy F., 1985). The most effective use of the incubator as a



tool for economic development will require careful consideration of the process by which those entrepreneurs choose to participate in the programme (Spitzer D.M. and Ford R.H., 1989). Allen D. N. (1985) showed relationship between business incubators and start ups as an Entrepreneurial marriage. To qualify for incubation program one must have: sound technical knowledge, competence in focus area, entrepreneurial traits, good business sense, global thinking, Conviction and strong perseverance and Strong references as per the Nirma Lab – one of the TBI in Ahmedabad. H.K. Mittal (2006), Advisor and Head, National Science and Technology Entrepreneurship Development Board, DST – Government of India has shown in his presentation that incubation is required because: Innovative ideas have longer gestation period and skill set of entrepreneurship is not well developed in all innovators.

Peter C. van der Sijde (2002) discussed main functions and task of an incubator in his article on *Developing Strategies for Effective Entrepreneurial Incubation*. He has said that The five key support needs for high-tech or knowledge-intensive companies are: Incubation and other facilities, Training and Knowledge, Mentoring – Coaching – Counseling, Money and Networking. He has also given idea about the main tasks of Incubator:

Human resources (personnel, technical capability, knowledge of the sector): The task of the incubator is to act as a provider or a broker for human resources — for example, through training courses, providing contacts to increase knowledge of the sector, and assistance in the hiring of personnel.

Social resources (access to networks): The incubator needs to provide entrepreneurs with access to two kinds of networks — one with other tenants in the incubator and outside entrepreneurs, and the other with the wider community.

Financial resources (4Fs – founders, family, friends and fools, banks, formal and informal investors): Incubators should have their own investment funds or have close links with investors who can act quickly.

Physical resources (such as machinery, trucks, office and laboratory space): An incubator should provide office and laboratory space on a flexible basis, which makes it possible for a company to grow with its market — more work, more personnel, more office and laboratory space; less work, less personnel, less office and laboratory

space. Sometimes incubators provide access to their laboratories. In other cases, the incubator liaises with a neighbouring university that is willing to share its facilities, under certain conditions, with companies. An incubator should also provide shared services (secretarial, mail, telephone, photocopying, fax, computer network).

Technology resources (access to knowledge and technology, patents, licenses): An incubator should provide, via its regional, national and international networks, access to knowledge and technology for its tenants, and should also market their products via the same networks.

Organizational resources (for example, advice/consultancy, mentors): On the staff of the incubator there should be at least one person who can provide advice and/or mentoring to the tenants whenever they need it. The commercial rationale behind this is that it costs the incubator management less time to provide these services than to find and establish a new tenant.

Tübke A. & Empson T. (2002) suggested six elements of a business incubation policy. These are strategic awareness, a positive attitude towards entrepreneurship, an active policy, the transfer of experience, provision of finance, and objective separation.

Paul Gatheru (2009) showed in his article related to concept of business incubation that Business incubation should have following services: shared premises, business advice, business services, networking, mentoring and a full time manager.

2.3 GIAN: (GRASSROOTS INNOVATIONS AUGMENTATION NETWORK)

GIAN is India's first technology business incubator focused on incubating and commercializing Grassroots innovations. Grassroots innovations are essentially solutions generated by people at the grassroots levels to tide over persistent problems, the solutions to which are either not available or not affordable by a large section of the consumer masses in developing countries like India. These innovations, therefore, capture an unmet need of a large section of the population and building a value chain around these innovations to take them to market holds the potential of wealth creation in a truly sustainable and equitable manner. The objective of GIAN is to build the value chain around these innovations with



the end objective of making these available to the masses through the market mechanism or otherwise. GIAN has been setup by NIF (National Innovation Foundation) at Ahmedabad, Guwahati and Jaipur for providing incubation support to Grassroots Innovations and traditional knowledge from the regions of West, North-East and North India respectively. In addition, GIAN cells are also present at Tumkur and Madurai at South India.

The problem for GIAN is: How to motivate grass root people to an entrepreneur who come out with great innovations? They lack in soft skills related to business because of their poor educational back ground. Most of the time, they have to go for the Technology Transfer rather than making them real entrepreneur.

3.1 A CASE: NATURE TECHNOCRATS

Arvindbhai, owner of Nature Technocrats, was thinking about his son - Jaimin who would be a Mechanical Engineer in 2 – 3 months. He had lots of hope on him. For his entire life, he was a great innovator and inventor but could not become successful entrepreneur in spite of getting lots of help from GIAN (Grassroots Innovation Augmentation Network), Technology Business Incubator. He had feelings that Jaimin would do something with his innovations and would build a business out of those innovations he made.

Arvindbhai had a small company named Nature Technocrats. He had many innovations like Auto Air Kick Pump, Solar Water Heater, Natural Water Cooler, Auto Sprayer, Natural refrigerator, Innovative tong etc. Out of which, he had converted some in to product and could do some business individually and with the help of GIAN (Grass Root Augmentation Network), Technology Business Incubator. But he was not happy with the result of business out of his innovations.

3.2 FOUNDER'S BACKGROUND

Arvindbhai was born in 1956 in Vanch village near Ahmedabad in India. When he was in 8th standard, he found his friend reading new things about technology which had inspired him to do same. That reading habits made him trying to develop something without proper knowledge.

He was the youngest son of his father. The father was not very enthusiastic in using money for the study of any of son as they were not good in study. Arvindbhai was very poor in study, even when reached to 10th standard. He was not able to

solve simple mathematical problems. After passing 11th standard, he took admission in to Pre – commerce and passed the examination without appearing for examination due to Nav Nirman Andolan. At that time, he thought that he would not get any job by studying all that. He decided to join any technical line which could give him job. He filled an application form of ITI (Industrial Training Institute) – Diesel Mechanic form but could not get admission because he had not taken Mathematics in his SSC examination. After someday, he inquired again about the same course and answer was no but he was told that he could get admission in to watch and clock repairing course. It was a course of two years. He took admission in to same course. Institute was far away from home, 2.5 hours journey by bus. So, he could not attend classes regularly. The instructor used to blast him, so he discontinued the course just after one and half months. But he learnt a lot very fast. That experience made him watch repairer for almost 5 years then. He was working from home only.

3.3 JOURNEY OF BUSINESS

With watch repairing, he joined a course of Automobile engineering and completed the same in two years. After a course of Automobile engineering, he underwent training at Ferguson Tractor Company for 6 months. Then he joined Car garage for 6 months and then, joined Diesel pump injector service centre for 6 months. Suddenly, he could meet one professor – A R Patel of L D Engineering College, Ahmedabad. With him, he went to college and saw some technical models. He found them very interesting. He earlier tried to make Gas Vehicle but could not run the project because of Government restriction. He also saw Solar project there. All those things inspired him a lot.

In 1979, he started working as an instructor for Diesel Cum Mechanic Mobile Classes started out of Government scheme. But that job could not last more than 6 months as Government closed the scheme. So, in 1980, he appeared for the interview of Gulf Jobs through his friend's contact. He got selected and he joined a company – Al Arfaz from Saudi Arabia. The job was related to technical maintenance. That job gave him a very good experience related car and automobiles in general. But in 1984, he had to leave the job because of family problem. But that job experience made him work and handle the job independently.



3.4 TECHNOLOGY INNOVATION AND INITIATION OF BUSINESS

In 1985, he purchased small industrial shed near Ahmedabad for job work with facilities like Lathe machines, grinder, drilling machine and some hand tools etc. While doing job work, he started thinking about doing some thing new as he got facilities of his own now. So, as he had seen the Solar Projects at L D Engineering College, he started making Solar water heater without any real technical calculations with very basic available raw material like glass, galvanized plates, wooden powder as insulator. With 50 litre of tank, he built first solar water heater for his home only and even used it for 5 years. But he could not commercialize it because of lack of soft skills for marketing. After doing job work for some years, he has realized that workshop was not working that well. So, he closed the workshop in 1987 but he did not sell the shed. At that time, he was staying at Vanch village and the shed was in Ahmedabad.

He had developed many innovations like Auto Air Kick Pump, Solar Water Heater, Natural Water Cooler, Auto Sprayer, Natural refrigerator, Innovative tong etc. The details of these are given in Exhibits.

4 AUTO AIR KICK PUMP

After closing the workshop, he started finding job again in Ahmedabad. He was travelling from Vanch to Ahmedabad by small moped scooter. The roads were very bad in condition and he was facing problem of puncture many a times. He could do puncture repairing but filling air in the tyres was a problem as he could not carry big foot pump on small moped. And that ignited idea of Auto Air Kick Pump in 1987 (Details in Exhibit 1). He made a 1st prototype model in 1987. He has talked to one fabricator about his discovery.

Fabricator, Navneetbhai, Ketel Industries, Ahmedabad, took interest in his project and promised to be an agent (Agency). He also promised to provide some investment. But he found that within one and half months, some body has copied and duplicated his model.

Even, he found that Jain Engineering, Vadodara also gave an advertisement of same kind of model. That made him surprised. But Jain Engineering could not make it properly, so they got failure. Meanwhile, he stopped business with Navneetbhai and started manufacturing Auto Air Kick Pump himself in his shed. He took a help of Maruti Enterprise for publicity and marketing of a product. Maruti Enterprise provided investment for

6 – 8 months. But after some time, he felt that Maruti Enterprise was not able to market the product properly as concept was new and unconventional. He could not go all the places for demonstration of a product. So, he partially stopped the business of the Auto Air Kick Pump in 1988.

4.1 SOLAR WATER HEATER AGAIN

In 1988, in frustration, he moved to solar water heater again. But now, he tried to use new raw material like, Aluminum sheets and Bajra grass with wood powder as an insulator.

He made a tank of PVC. He made solar collectors from copper tubing instead of galvanized plates. He again started with home and then commercialized the product himself. Even, he was installing the product himself. He received good response from market but the product was rejected by GEDA (Gujarat Energy Development Agency) for registration for subsidy etc.

In 1993, he could meet Prof R D Desai, Vivekanand College and got guidance from him. They made a program on Solar water heater made by him. The program was shown on TV. But it did not increase his sales significantly. So, he started living in Ahmedabad in rented house in 1993 to give more time to his business activities. In 1995, he purchased his own home in Maninagar area of Ahmedabad.

4.2 NATURAL WATER COOLER

In 1996, Arvindbahi got sever fever. He was lying on the bed. Her wife was putting wet towel on his forehead and the fan was running. After some time, the water was evaporated and his forehead got cooled. It ignited a new thought in his mind and that brought the concept of Natural Water Cooler in his mind (See details in exhibit 2). After recovering from fever, he started working on the project of Natural Water Cooler. Earlier experience of duplication of Auto Air Kick pump made him learn about patent. He found out patent office address and got details related to patent filing. He was supported by Prof. J A Shah of L D Engineering College, Ahmedabad. He sent all details in well formatted manner to the Patent Office – Calcutta, India and got the provisional patent in just three months in 1997. He informed Energy Department of Government of Gujarat. The program on same was also telecasted on Dur Darshan – Government T V channel in India.



Energy Department pushed the matter to GEDA. GEDA invited him with documentation in 1998. GEDA put two conditions – (1) 50-60 people should be able to drink water and (2) Cold water should be available till end on the basis of evaporation concept. He was asked to test the model. The process was very slow. So, it made him frustrated. At that time, Shri Atal Bihari Vajpayee was the prime minister of India. He went to Prime minister's office with letter. He did not get chance to meet prime minister but next day, he could meet Personal Assistant of prime minister. He was promised to have some actions in this regard. He pushed the matter to Ministry of Non Conventional Energy Sources. Then the ministry sent letter to GEDA to support him immediately with copy to him. The Executive engineer acted fast now and sent reply to ministry. He called Arvindbhai again and asked him to test his models. He was asked to put two models of Natural Water Cooler and one model of Solar Water Heater.

4.3 ROLE OF TECHNOLOGY BUSINESS INCUBATION

One day, he went to GEDA for discussion and suddenly, could meet Maheshbhai Patel, Chief Innovation Manager of GIAN (Grassroots Innovation Augmentation Network) – Technology Business Incubator in Grass root area. That moment brought significant changes in his life. He gave his all files related to his innovations to Maheshbhai Patel. Maheshbhai showed them to Prof Anil Gupta of Indian Institute of Management – Ahmedabad who was a vice chairman of NIF, GIAN and Honey Bee Network to promote Grassroots Innovations in India. Arvindbhai could meet Prof Gupta and explained him about his economic problems. Prof Gupta promised him to do something about his innovations.

1st help from GIAN came as a support of Rs.23500 interest free loan to make testing models for GEDA. So, he made models with the help of GIAN for testing. GEDA has paid him testing fess and cost of the models. So, he could repay Rs.23500 to GIAN again in just two months. It was nice experience to him. Then he made a prototype model of Natural Water Cooler for GIAN for demonstration. So, even GIAN could use it for publicity etc.

GIAN started publicity of the Natural Water Cooler and it showed the result as he received the 1st order from one petrol pump. But GIAN could not support him for his entire requirement as it had to work in particular format as per the guideline of the ministry. To make his

Natural Water Cooler as per the market requirement, he had a requirement of cutting die and other spares of Rs.50000. So, he had to take a loan from one person – money lender as it was difficult for him to get loan from bank etc. He was determined to do business systematically now. He got the fabrication done out side and then, he was doing assembly at home only as he had already sold his shed at cheap rate due to Government Road development project.

GIAN was conducting fairs for similar kind of Innovations. His models were put in GIAN's fair which helped him to meet people, demonstration of his models but it could not get him customers' orders significantly. GIAN made leaflets and pamphlets for his models for publicity. In 1999, he got patent on Natural Water Cooler with the help of GIAN. All these helped him boost up his confidence and he could sell 9 Natural Water Coolers himself in 1999-2000. GEDA also gave him order of 10 Natural Water Cooler for different locations in Gujarat in July, 2000. But he faced problems of getting raw material due to lack of finance for such a big order at once. He got frustration again. GIAN could not help him financially for such a big order. He had to manage himself.

Finally, to fulfill the requirement of the order received from GEDA, he decided to transfer the technology to some body who could handle business effectively. With the help of GIAN, the technology of Natural Water Cooler was transferred to Nature Products, Ahmedabad for 5 years. He would be getting Rs.3 lacs royalty for 5 years on half yearly installments. But he faced lots of problems during installations and other technical aspects with same company. But still, he continued with the business as he had not got any options.

But the worst came to him in 2002. In 2002, Gujarat faced riots. It affected his business very much. So, Nature Products cancelled the contract of Technology Transfer. He had to return checks.

In 2003, GEDA gave him order of 15 Natural Water Coolers. Again, he took loan from a person – money lender and fulfilled order as GEDA did not provide advance. Not only that, GEDA delayed his payment for almost a year which made him paid more interest. Even, GIAN could not support him financially. He felt that GIAN could have supported him properly to get the loan from bank. But all those things were so slow that he had a feeling of loosing order from GEDA. But that order built up his confidence level. He got another order of 30 Natural Water Cooler from GEDA and



again he had to take loan from person – money lender because of lack of support from any other agency including GIAN. The GIAN was also facing problem of shortage of funds due to limited grant they had received from Government of India.

The GIAN supported him mainly as discussed above. The GIAN helped him in forwarding his innovations to the appropriate bodies and publicity mainly. He did not get enough financial support from GIAN, he claimed. Even he did not get any formal training from GIAN to increase his soft skills in building his business. Other wise, he would have done his business in a better manner, he claimed.

The problem with the model of Natural Water Cooler was that he was only getting some orders from GEDA. Normal public could not digest his model of Natural Water Cooler because of lack of proper marketing. Some time, he could convince some people but initial cost of Natural Water Cooler was high because of copper tank technology. He felt that people should understand the savings they could have out of power saving.

In 2004, there was a food festival in Ahmedabad, so one party has come to him inquiring about Natural Water Cooler but some how could not converted in to order.

So, again in 2005, with the help of GIAN, he gave contract of technology transfer of Natural Water Cooler to Rachana Industries, Ahmedabad. The contract was of 5 years with Rs.60000 as a down payment and Rs.300/ piece. He felt that he should have got Rs.800/ piece at least as per the opinion given by one person from GEDA. But then, contract was already finalized, so he could not do anything. That reduced his income on Natural water Cooler as compare to earlier when he was doing business himself. But, it gave him more time to think about new innovations. He was feeling that he should not continue this contract after completion period. He might think to give it to somebody else but not to do business himself. He was thinking of more innovations.

Mean while, during this period, GIAN also supported his project of Auto Air Kick Pump. The GIAN did some publicity for Auto Air Kick Pump also. With the help of GIAN, he won the prestigious President of India award for Innovations worth RS.50000. The GIAN helped him filing patent for Auto Air Kick pump in 2000 and was pending but now it was cancelled due to technology obsolescence. Even, technology of the same was transferred to Mould well Enterprise,

Maharastra in 2002. The GIAN tried enough for publicity of the same during 1998-2000 but could not get good market response. So, they decided to transfer the technology. The contract was of 3 years with Rs.25000 of down payment and 2% royalty / piece which come around Rs. 200 – 250 / piece.

The Auto Air Kick pump was more useful for Two Stroke engine vehicles. But after more and more 4 stroke vehicles had entered in to market, the technology became obsolete. So, they could sell only 6000 units of the Auto Air Kick pump. After three years, the contract was cancelled.

So, he developed new device – Auto Air Pump in 2004-05. He made prototype himself and shown demo to GIAN. The new model was useful for 4 stroke engine vehicle also. The GIAN showed that new model to 2 -3 companies for possible development but no body took any interest. So, GIAN did not support that project. Even, fair model of the same could not be developed. The project was risky, so he himself could not proceed forward with the new project on Auto Air Pump. At that time, he was facing illness and burden of study of children was also there. Even, it was difficult to run home and getting finance for such a model which had not been proved was difficult.

4.4 AUTO SPRAYER

When Arvindbhai joined GIAN, he saw the model of sprayer to kill pesticide made by Kheemjibhai. He himself was a farmer basically by family background. He also had Automatic watch experience. Hence, he developed the rough model of Auto Sprayer and discussed with GIAN. GIAN did not respond well. So, he took help of Gram Technology, Gandhinagar in 1999-2000 to develop a prototype model of Auto Sprayer with just Rs.3000.

He again went to GIAN with model and then GIAN got convinced then. GIAN gave him Rs.1200 to make a fair model. He made a fair model but nothing happened during 2000 to 2003. GIAN sent it to NID (National Institute of Design), Ahmedabad for proper design. They made a proper design but weight was more.

At this time, he never wanted to take risk, so, he filed a patent in 2003 with the help of GIAN. GIAN sent it to CMERI (Central Mechanical Engineering Research Institute) for proper redesign. But still, after more than 3 years now, nothing has come out of that. He told that he should be allowed to go to that institution directly but he



was not allowed. The process was very slow. It was giving him lots of frustration.

4.5 NATURAL REFRIGERATOR

On the basis of Natural Water Cooler, he developed the concept of Natural Refrigerator in 2001.

He discussed with GIAN. GIAN did not show much interest as they have carried out feasibility study and the result was not encouraging. They were not ready to support this again for commercialization. For last 8 years, the model of Natural refrigerator was lying in his compound but no body came to see his model. He had a hope from Gram Technology but even no body came from Gram Technology. Gram Technology had sanctioned Rs.15000 for the model but they did not pay him fully.

4.5 INNOVATIVE TONG

In 2002, Prof Gupta gave a problem of improvement in normal tong. He found that big pots were not handled by normal tong but with the help of clothes. Therefore, Arvindbhai started thinking about improvement in normal tong. He developed mechanically operated tong in 2002 and same concept could be used for big pots also. In 2005, he redesigned it and shown to GIAN. But unfortunately same thing was developed by some body else also.

Actually he was alleged for duplication of the concept developed by some body else. Arvindbhai denied the allegation. He was not happy with that incident. He started doing business of tong him self without any help. Even the investment in this project was low comparatively.

From the same concept, he developed adjustable tong for the different weight categories of 2.5 kg to 15.5 kg. And he was doing its business himself.

4.6 BUSINESS FUNCTIONS

As we could see from above discussion, most of the manufacturing activities, he did from his own workshop initially with some basic machinery. After wards, he did all manufacturing activities from his home only by himself and with the help of some local helpers. Some parts were manufactured through local fabricators.

Regarding marketing, he was helped by GIAN a lot in terms of trade fairs, exhibitions, leaf

lets etc. He himself did personal selling most of the time. But lack of soft skills hampered his efforts a lot.

4.7 FAMILY REACTION AND CONTRIBUTION

Anilbhai's wife was in teaching profession and was a great help to him as his income was very uncertain. His wife was not so happy about his innovations earlier when he had been struggling very hard. She felt that he would be better in job rather than doing business with his innovations. But when he got award from the President of India, she was happy. But she always felt that he was not getting real reward out of his innovations. She told that there were lots of delays in government procedure and getting money from government agencies.

She was feeling that – 'Life is very fast and he is getting everything very slow.' She told – 'it is very difficult to run home if I don't earn. Innovations are fine. It can give to lot of respect and awards but it should also give you financial rewards for sustainability and growth.'

4.8 PROBLEMS, CHALLENGES AND FUTURE

Arvindbhai told that normally patent was granted for 20 years and if the commercialization process was slow then one could not earn enough money out of patented technology. GIAN helped him filing patents but they also deduct some amount from royalty. GIAN helped him a lot but the process was so slow that one could not get enough money out of technology. And some time, if process was slow then the technology itself could become obsolete.

GIAN helped him in many ways like – development of prototype models, documentations, publicity, patent, partial financial support for developing fair model, even paid for train tickets when he went for receiving award from the president of India. GIAN increased his morale and confidence. He felt that he might not have achieved even this much if GIAN was not there.

The major problems faced by Arvindbhai, as perceived by him, are as follows:

- *Procedural delay:* Arvindbhai has perceived that there was some delay in commercialization of his innovations with the help of GIAN.



- *Low involvement of an innovator in decision making about his own innovations:* Arvindbhai perceived that his involvement was low in decision making about his own innovations.
- *Low direct contact with experts / design agencies:* Arvindbhai perceived that he was not allowed to meet experts / design agencies directly many times.
- *Less / no fund for risky innovations:* Arvindbhai perceived that GIAN had not supported him for some risky innovations.
- *Technology Transfer mechanism was not effective:* Arvindbhai was not very much happy with technology transfer mechanism.
- *No formal training for Grassroots innovators with poor educational background:* Arvindbhai perceived that he should have been provided formal training of business functions and soft skill. He felt that the formal training would have made him more successful entrepreneur.

He felt that lack of proper education had cost him a lot. Even, his poor English and communication skills affected his business. He did not receive any formal business training, so he was doing his business on judgmental basis only. His poor financial condition could not support his innovations to be converted in to successful business.

For him, challenges were always there when you were developing something new. Some major challenges he stated:

- Innovations to commercialization , time taken and rewards earned out of that – very slow
- Copy of innovations

- Fear of technology transfer as do not have proper past data for selling new technology
- Getting fund to support for innovations to commercialization
- *Obsolescence of technology*

He struggled a lot in his life with all great innovations. His income of last three years, 2006-07, 2007-08 and 2008-09 from his business or innovations was just Rs.35000, Rs.64000 and Rs.51000 only. But still, he got hope from Natural Water Cooler and Natural refrigerator in future more and more people would start thinking about energy conservation. This project could be extended to many sectors like Vegetable, Medicine, Milk Foods etc. where temperature requirement would be moderate and not so cool. He got hope that government would support his project as a tool for energy saving. It could be more hygienic also.

Now, he was not planning any more new innovations but would try to push all his innovations in to better business. He got lot of hope from his son who would be an engineer in short time. He felt that with the help of his son, they could build a good business around his innovations. He felt that he had not got any business and communications skills but his son was having that. So, it would make difference in future.

5. ANALYSIS AND FINDINGS

Here, on the basis of analysis of the case developed on Nature Technocrats, discussion with Techno-Entrepreneur – Arvindbhai Patel, information received from GIAN and literature review of records, pattern matching was done with the help of the conceptual framework for TBI as follows:



Pattern matching in Case with Conceptual framework for Technology Business Incubation

<i>Component of support services</i>	<i>Sub components</i>	<i>As claimed by TBI (GIAN)</i>	<i>As perceived by Entrepreneur</i>
Physical Resources	Machinery	Yes - Not Directly but Through Tie up	Yes - Not Directly but Through Tie up
	Office	No	No
	Laboratory	Yes - Not Directly but Through Tie up	Yes - Not Directly but Through Tie up
	Shared Services (Secretarial, Mail, Telephone, Photocopying, Fax, Internet, Computers etc.)	Yes - partial	Yes - Partial
Human Resources	Helping hiring people	Yes. Only advice	Yes. Only advice
	Full time management team	Yes	Yes
Technology Resources	Access to knowledge and technology	Yes – very much	Yes – very much
	Patents (IPR) & Licenses etc.	Yes – very much	Yes – very much
	Technical documentation	Yes – very much	Yes – very much
Organizational Resources	Consultancy	Yes – very much	Yes – very much
	Mentoring	Yes – very much	Yes – very much
Networking	Internal (other tenants of TBI, professors etc.)	Yes – very much	Yes – very much
	External (Other entrepreneurs, similar organization, venture capitalist etc.)	Yes – very much	Yes – very much
Finance	Direct (through Own fund)	Yes – small amount up to Rupees 1 lakh	Yes
	Indirect (Through VC, Bank, Financial corporation, Investors etc.)	Yes – but not effective	Yes – but not effective
Training	Business Management functions	No formal training, only mentoring	No formal training, only mentoring
	Soft skills	No formal training, only mentoring	No formal training, only mentoring
	Technology	No formal training, only mentoring	No formal training, only mentoring
	Business Plan	No formal training, only mentoring	No formal training, only mentoring
Technology Transfer		Yes – very much	Yes – very much
Marketing		Yes – very much	Yes – very much
Marketing Research		Yes – very much	Yes – very much
Financial Management and Accounting		No – but explain	No – but explain
Legal and Regulatory		Yes	Yes



Description and Findings:

- **Physical Resources Supports:** actually GIAN has limited fund. Gujarat Government has given initial corpus fund of Rupees 40 lacs in 1998 and NIF has given Rupees 30 lacs in 2002-03. So, they are running their organization from the interest earnings of the same fund. Hence, providing effective physical support for them is difficult. In terms of machinery, GIAN does not provide direct help but they tie up with workshop or fabricators for the same. Same is the case with laboratory support. They tie up with some technical institutions for laboratory support. GIAN does not provide office space as they do not have enough space. GIAN itself is in rented space at Ahmedabad. They normally try to make innovators (incubatees) work from their home and they maintain constant touch with them. In terms of shared services, they provide partial support as and when required by incubatees. Arvindbhai also got all these supports as described in case 2. He got many times help from fabricators and technical institutions with the help of GIAN. Normally, he worked from home. In case of Nature Technocrats of Arvindbhai, GIAN took help of NID (National Institute of Design) and even CMERI (Central Mechanical Engineering Research Institute) for proper design of his innovations as described in the case 2.

- **Human Resources Supports:** Normally, GIAN does not provide any direct help in hiring people but gives advice to their incubatees regarding hiring better people for their companies. GIAN has full time management team which includes: Chief Innovation Manager, Manager – Technology, Manager – Business, Finance and Administrative Officer. They give their all supports pertaining to all the aspects of incubation process. GIAN is having limited fund, so GIAN has small team. It is very difficult to find better people with skills at low salary. Arvindbhai got full support from this management team from time to time for all his innovations.

- **Technology Resources Supports:** GIAN gives full support in terms of access to knowledge and technology to their incubatees and innovators. They support with the help of NIF (National Innovations Foundation), Honey Bee Network, SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), DSIR (Department of Science and

Industrial Research), Government of India, CSIR (Council for Science and Industrial Research), Many engineering and Technology Institutions, National Institute of Design, NITs, IITs etc. Regarding Patents (IPR) issues, GIAN has PAC (Patent Assistance Cell) to help innovators. PAC provides basic education related to patent to innovators and even general mass by means of disseminating information and workshops. The cell evaluates and search for patent related information. It gives active support in filling patent on behalf of innovators with the help of network attorney. GIAN even pays fees for filling patent. All these services are given to innovators (incubatees) of GIAN at free of cost. But they take nominal charges from other individuals and organizations which may vary from Rupees 5000 to 30000. Normally they renew the patent for few years but afterwards they expect innovators to renew the patent by paying nominal fees. It also helps in technical documentation. Usually, 1 to 2 months time is taken for filling patent and normally patent is awarded in 1 to 2 years time. Arvindbhai also got all these supports for his innovations as described in the case 2. He got patent for his innovations with the help of GIAN. He went to GIAN with his raw innovations and the appropriate shape was given to his innovations by proper design and documentation with the help of GIAN.

- **Organization Resources Supports:** GIAN provide full support in terms consultancy and mentoring to their innovators. The management team maintains continuous touch with the innovators and guides them in all the aspects of technology and business functions though their innovators and incubatees are wide spread. Arvindbhai got full support from GIAN in terms of consultancy and mentoring. He got mentoring for all his innovations. He got all important advice from GIAN from time to time for his different innovations.

- **Networking Supports:** GIAN has very good networking support for his innovators and incubatees. GIAN allows networking with other innovators and incubatees. GIAN has got very good networking through NIF (National Innovation Foundation), Honey Bee Network (network of individuals, innovators, farmers, scholars, academicians, policy makers, entrepreneurs and non-governmental organizations (NGOs). A Network having presence in more than seventy five countries,



what has made Honey Bee Network tight knit and efficiently functional is its philosophy and SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) as a part of their internal network. Regarding external network, GIAN has networking with various DSIR (Department of Science and Industrial Research), Government of India, CSIR (Council for Science and Industrial Research), GEDA (Gujarat Energy Development Agency), Many engineering and Technology Institutions, National Institute of Design, NITs (National Institute of Technology), IITs (Indian Institutes of Technology) and IIMs (Indian Institute of Management) etc. GIAN has networking other TBIs but GIAN is a unique TBI in India which supports Grass root Innovations. GIAN has some networking with Venture Capitalists and financial corporations but it is not giving real success in terms of financial support as they do not take much interest in Grass root innovations which can only be converted in to small business venture with lot of risk involved in terms of capability of Grass root innovators with lower educational back ground. Arvindbhai got this networking supports from time to time for his projects. Particularly he got many orders of Natural Water Cooler from GEDA. He could also exhibit his innovative products at various networking institutions. His innovations were sent to NID and CMERI like institutions for proper design.

- **Financial Supports:** Regarding direct financial support, GIAN gives small support up to Rupees 1 lac to their innovators normally as a seed grant for testing and prototype development and initial commercializing activities. GIAN has two basic funds: (1) VARD and (2) MVIF to support their innovators and incubatees. VARD is Value Addition Research and Development fund created with the help of NIF to support mainly the testing and prototype development. GIAN has created another fund named MVIF (Micro Venture Innovation Fund) with the help of Government of India, SIDBI (Small Industries Development Bank of India) of Rupees 4 crores in 2004. This fund is managed by NIF. Through this fund GIAN support pilot scale production and other commercializing activities. Arvindbhai got the fund from GIAN for his innovations particularly for his natural water cooler model. He got Rupees 23500 for developing prototype model for testing. Even, he got the fund support for Auto sprayer and Auto Air Kick pump. Apart from these, GIAN helps their innovators to get fund for their projects through various Government scheme like TePP (Techno-entrepreneurship Promotion Program). GIAN has network with Banks, Financial corporations and Venture Capitalists

but as mentioned in earlier section it is not giving real success in terms of financial support as they do not take much interest in Grassroots innovations which can only be converted in to small business venture with lot of risk involved in terms of capability of Grassroots innovators with lower educational back ground. Some time, the angel investors also come to look for innovations but mostly GIAN is not getting success to get their support due to reasons mentioned above.

- **Training Supports:** GIAN does not provide formal training to their innovators in terms of Business management functions, soft skills, technology and business plan. GIAN has limited fund and space which does not support formal training programs. For providing formal training, they might have to design course curriculum etc. which may not be possible for GIAN with limited fund. In past, they have tried but they could not get success as they had to deal with Grassroots innovators with very low educational background who had not taken much interest. It is really difficult to convert Grassroots innovators in to Techno-entrepreneurs, claimed by the officials of the GIAN, so they basically focus on Technology Transfer. GIAN provides indirect training on all these aspects informally through continuous mentoring as mentioned in earlier section. Arvindbhai did not get any formal training from GIAN related to Business management functions, soft skills, technology and business plan but he got continuous mentoring from GIAN about all these aspects. But Arvindbhai felt that he should have been given formal training on all these aspects. If he could get the formal training from GIAN, he would have more success in his business. But he could not get training because of reasons mentioned above.

- **Technology Transfer Supports:** GIAN gives full support in Technology Transfer. Actually, GIAN's focus is more on Technology Transfer than to convert innovators in to Techno-entrepreneurs because of low capabilities of Grassroots innovators with lower educational back ground. Focus is to make them earn out of their innovations, so the Technology Transfer would be the better option as per the GIAN. Almost in 90% cases, they have focused on technology transfer rather than converting innovators in to Techno-entrepreneurs, claimed GIAN officials. Technology Transfer mechanism at GIAN is very transparent with legal documentations in local language. Prior consent of innovators is always taken. But the process is very much challenging as each and every technology is new and unique. The valuation of technology is very difficult. Normally, through



negotiation with both the parties – innovators and the other company, the Technology Transfer takes place. GIAN acts as a mediator between them. GIAN always tries to protect the interest of the innovators. GIAN puts the details of the all innovations on websites of GIAN, NIF, Honey Bee Network and SRISTI for publicity. They also put all their innovations in exhibitions etc also. Whenever there is any inquiry from any company, GIAN officials visit the company to check feasibility in terms of financial, marketing and all other business functions capabilities. They also check similarity of its present business with innovation and appropriate match making is done. The Technology Transfer can be of two types here: (1) Technology Transfer with Exclusive rights which priced more and (2) Technology Transfer with non Exclusive rights which priced less. GIAN does valuation of the technology innovations on the basis of market references which is quite difficult and challenging. After bargaining and negotiations, they come out with appropriate agreement. Arvindbhai also got benefit of the Technology Transfer with the help of GIAN though he was not so happy about this but from our study we could find that mechanism of Technology Transfer is fair but difficult; hence, some amount of frustration from innovators' side may always be there. He tried to develop his business out of his innovations with the help of GIAN but after some time they (he and GIAN) have realized to go for the Technology Transfer in case of his some innovations which could earn him some amount of money out of his innovations. With the help of GIAN, the technology of Natural Water Cooler was transferred to Nature Products, Ahmedabad for 5 years. He was to get Rs.3 lacs royalty for 5 years on half yearly installments. But afterwards, the contract got cancelled. So, again in 2005, with the help of GIAN, he gave contract of the Technology Transfer of Natural Water Cooler to Rachana Industries, Ahmedabad. The contract was of 5 years with Rs.60000 as a down payment and Rs.300/ piece. Even for Auto Air Kick Pump, technology was transferred to Mould well Enterprise, Maharashtra in 2002. The GIAN tried enough for publicity of the same during 1998-2000 but could not get good market response. So, they decided to transfer the technology. The contract was of 3 years with Rs.25000 of down payment and 2% royalty / piece which come around Rs. 200 – 250 / piece. Technology Obsolescence is also very important parameter here as this technology was dependent on two stroke petrol engine, as soon as demand of the two stroke petrol engine vehicles was gone down;

the demand of the Auto Air Kick pump had also gone down. So, after three years the contract was cancelled.

- **Marketing Supports:** GIAN gives very much supports in terms of Marketing to their innovators and incubatees. They organize exhibitions, participate in other exhibitions, make leaflets etc. to help innovators to market their innovative products. They do marketing from GIAN office directly also. They put details of all the innovative products and technology innovations on the websites of GIAN, NIF, SRISTI and Honey Bee Network to help innovators in marketing. GIAN conducts test marketing for innovators' products. GIAN's job over here is very challenging as they have to deal with Grassroots innovators who do not have appropriate soft skills to market the product. Arvindbhai got similar marketing help from GIAN from Time to time for his innovations and innovative products. GIAN has good brand equity in India which helps innovators to market their innovative products or to transfer the technology of the products.

- **Marketing Research Supports:** GIAN team conducts the Marketing Research themselves with the help of summer intern. They also take help of students and professors of academic institutes like IIM Ahmedabd for the Marketing Research. Mainly, this is done to check market potential for their innovators' innovations and innovative products. In case of Arvinbhai's innovations, they have done the Marketing Research. On the basis of that, they have selected some innovations like Natural Water Cooler, Auto Sprayer and Auto Air Kick Pump for incubation support but they have rejected the concept of Natural refrigerator initially.

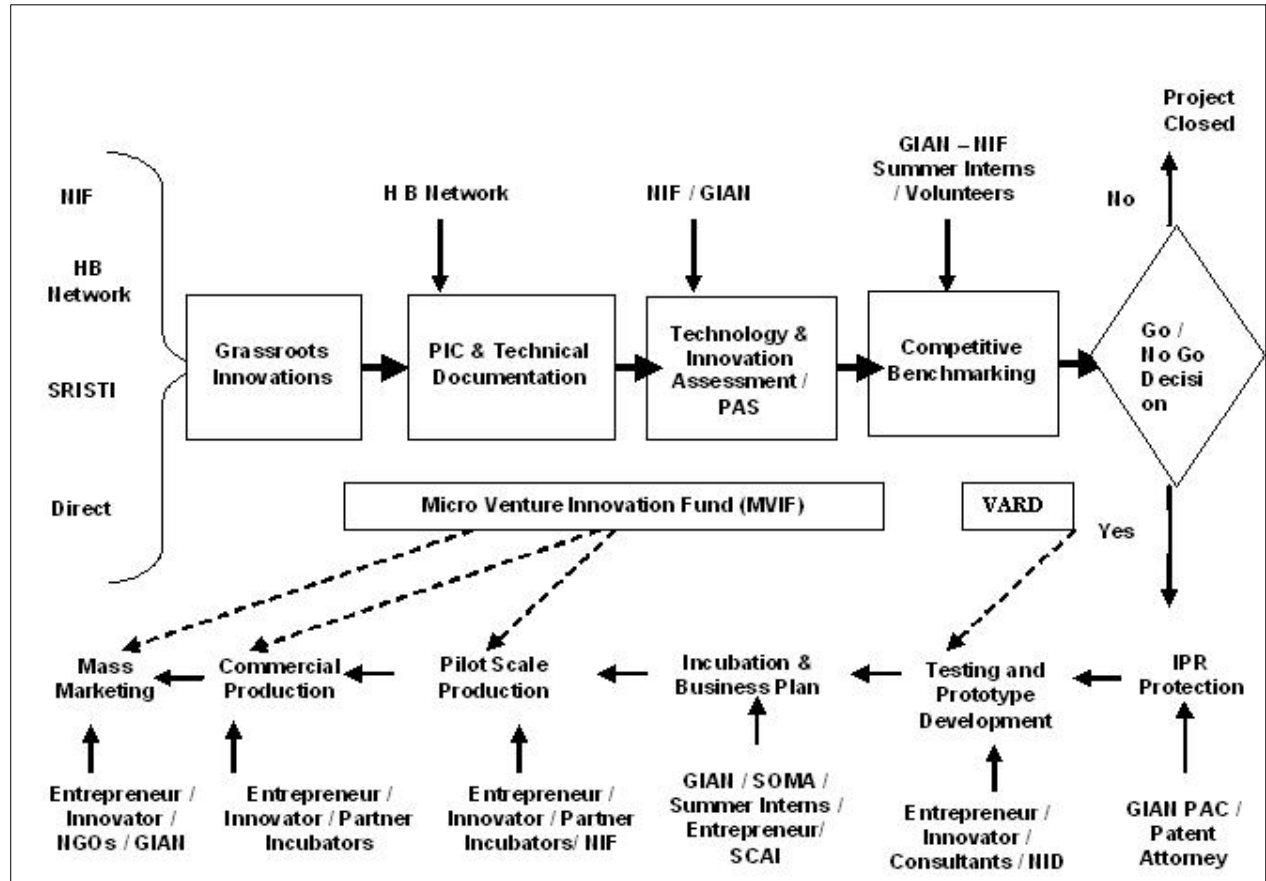
- **Financial Management and Accounting Supports:** GIAN does not provide direct support in maintaining accounts and managing finance of the incubatees but they teach them how to manage finance and accounting. Arvindbhai also got some learning to maintain his finance and accounting.

- **Legal and Regulatory Supports:** GIAN provides legal support with the help of network legal agencies particularly in filling for patent etc. Arvindbhai got this support too. Here, the business ventures are small and micro, so formation of corporate companies does not come in to picture normally.



TBI Process at GIAN:

Here, on the basis of analysis of the case developed on Nature Technocrats, discussion with Technopreneur : Arvindbhai, information received from GIAN and the literature review of records, the TBI process at GIAN can be described as follows:



TBI Process at GIAN

Above figure shows the TBI process at GIAN.

- *Scouting of innovations* is done through NIF, Honey Bee Network, SRISTI. NIF is National Innovation Foundation which runs many chapters at various institutions in India. They have pull of Innovators. Honey Bee Network is a network of individuals, innovators, farmers, scholars, academicians, policy makers, entrepreneurs and non-governmental organizations (NGOs). SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) also supports in scouting for innovations. Many innovators directly come with their innovations to GIAN. They conduct SHODH YATRA. Shodh Yatra is a journey for the search of knowledge, creativity and innovations at Grassroots. Shodh Yatra is an attempt on the part of SRISTI to reach out to the remotest part of the country with a firm belief that hardship and challenges of natural surroundings

are the prime motivators of creativity and innovations. Shodh Yatra aims at unearthing such traditional knowledge and Grassroots innovations that have not only simplified the lives of men, women and farm laborers but have also significantly contributed towards the conservation of bio-diversity. Shodh Yatra is a journey of mutual exchange and sharing of knowledge. Whatever knowledge and practices pooled in, over the years are shared with the villagers during the Shodh Yatra. The Honey Bee database is also shared with the villagers. Shodh Yatra is also a journey to spread green consciousness and women & children are also involved to display their ecological knowledge through various competitions. They give advertisement in news paper about their various activities to encourage innovators to apply. The focus is on Grassroots Innovations. GIAN is helping unaided,



unqualified, untrained individual innovators from the informal sector who have conceptualized/developed technological innovations and / or outstanding traditional knowledge practices. In the case of Nature Technocrats, Arvindbhai could directly meet Chief Innovation Manager of GIAN accidentally during his visit to GEDA and then he discussed about his innovations to him. The Chief Innovation Manager of GIAN invited him to GIAN and made him meet Prof. Anil Gupta, Vice chairman of NIF and GIAN.

- **PIC and Technical documentation:** PIC is Prior Informed Consent. PIC is taken from innovators when they apply to GIAN. It is in two forms: (1) PIC for Traditional Knowledge and (2) PIC for Technology Innovations and Ideas. Traditional is any knowledge, innovation or practices produced by individual knowledge experts, healers, craft person etc., alone or in groups or community a long time ago or several generations ago. At this stage, prior consent of the innovators is taken in an application format which is also available in local languages. It comes with explanatory notes also. This normally includes consent of the innovators for sharing his innovation with other agencies, entrepreneurs, magazines, for IPR, for commercialization of technology etc. As Grassroots innovations come in raw form, detailed technical documentation is made by GIAN with the help of Honey Bee Network and other agencies if required. In the case of Arvindbhai, PIC with Technology innovations and knowledge was performed for his technology innovations.

- **PAS / Technology Assessment:** PAS is Prior Art Search. At this stage, evaluation of technology is done in terms of Patent (IPR issues) through Patent database, through internet, in market and other information resources to check whether it is really innovative. It is done by GIAN with the help of NIF. In case of Arvindbhai, all his innovations were passed through this stage. He faced problem in case of his one innovation that was innovative tong. Where he could not justify his innovation.

- **Competitive Benchmarking:** This is done by GIAN with the help of NIF, Volunteers and summer interns. They will check whether innovation has viability in market in terms of competition or not. They check about similar kind of products available in the market at what price, how much resources those competitors are having and try to match all these with their innovations. They check whether the innovation has market potential or not and can sustain in the market or

not. In case of Arvindbhai also, this is done for his innovations.

- **Go / No Go Decision:** After competitive benchmarking, normally GIAN decides whether support the innovations for commercialization or not. Arvindbhai's Natural water cooler was supported but Natural refrigerator was not supported.

- **IPR protection:** At this stage, to protect the technology innovation in terms of IPR, process of filling patent is started. GIAN has PAC (Patent Assistance Cell) to help innovators. PAC provides basic education related to patent to innovators and even general mass by means of disseminating information and workshops. The cell evaluates and search for patent related information. It gives active support in filling patent on behalf of innovators with the help of network attorney. GIAN even pays fees for filling patent. All these services are given to innovators (incubatees) of GIAN at free of cost. But they take nominal charges from other individuals and organizations which may vary from Rupees 5000 to 30000. Normally they renew the patent for few years but afterwards they expect innovators to renew the patent by paying nominal fees. It also helps in technical documentation. Usually 1 to 2 months time is taken for filling patent and normally patent is awarded in 1 to 2 years time. He got patent for his innovations with the help of GIAN. He went to GIAN with his raw innovations and the appropriate shape was given to his innovations by proper design and documentation with the help of GIAN.

- **Testing and Prototype Development:** Here at this stage, the prototype model of the technology innovation is developed. VARD is Value Addition Research and Development fund created with the help of NIF to support mainly the testing and prototype development. Arvindbhai also got this fund to develop the prototype for his innovations as discussed in earlier section.

- **Incubation and Business plan:** Here the incubation support services which also include preparing business plan are started. Here, prospective entrepreneurs himself try to make business plan with the help of GIAN, SOMA (Student Organization for Managerial Assistance) of IIM A, Summer interns, SCAI (Student Club for Augmenting Innovations) in various institutions. The details of incubation support were already discussed in earlier



section of pattern matching with conceptual framework of TBI. Arvindbhai also got this support from GIAN.

- **Pilot scale production:** At this stage, small quantity of product was produced to check the production viability and test the market. This has happened in the case of Arvindbhai.

- **Mass marketing and full commercialization:** Once the result of the pilot production is successful, full commercialization with mass marketing takes place. This has happened in the case of Nature Technocrats. But after some time, he could not get kind of success what they have expected, so they have gone for transfer of technology for his some of technology innovations as described earlier.

Focus: GIAN's focus is more on the Technology Transfer than to convert innovators in to Techno-entrepreneurs because of low capabilities of Grassroots innovators with lower educational background. Focus is to make them earn out of their innovations, so the Technology Transfer would be the better option as per the GIAN. Almost in 90% cases, they have focused on the Technology Transfer rather than converting innovators in to Techno-entrepreneurs, claimed GIAN officials. As on 2009, GIAN and NIF have handled more than 130000 innovations and traditional knowledge. Every year, they receive around 25000 technology innovations and traditional knowledge ideas and out of that after screening, they normally support 50 innovations. Their focus is to support mass. GIAN is helping unaided, unqualified, untrained individual innovators from the informal sector who have conceptualized/ developed technological innovations and / or outstanding traditional knowledge practices.

6 PROBLEMS AND CHALLENGES

Arvindbhai faced some problems in TBI process of GIAN as he was a Grassroots innovator with low academic qualifications and low soft skill to convert his innovations in to business. The major problems faced by Arvindbhai, as perceived by him, are as follows:

- **Procedural delay:** Arvindbhai perceived that there was some delay in commercialization of his innovations with the help of GIAN. GIAN officials have given justification for this. Basically, GIAN supports Grass root innovations and Grassroots innovators bring their innovations in raw form which required to be given proper marketable product shape with the help of

network design institutions. GIAN supports mass Grassroots innovators who are unaided, unqualified, untrained from the informal sector. Every year, they receive 25000-30000 innovations and out of that they support around 50 innovators after screening. So, Arvindbhai was not the only one whom they were supporting. Other problem with GIAN is that they have limited fund and small management team to support wide spread Grassroots innovators. But still, the normal time for commercialization is 1 to 2 years which is normal time taken by any other TBI centers also.

- **Low involvement of an innovator in decision making about his own innovations:** Arvindbhai perceived that his involvement was low in decision making about his own innovations. GIAN officials have given justification for this also. At the time of selection, innovators consent is always taken by means of PIC (Prior Informed Consent). And Grassroots innovators come with raw innovations without specific technical data, so some autonomy from GIAN side is always required to convert those innovations in to marketable product. At a time, GIAN is handling many projects, so every time taking views of innovators is always difficult.

- **Low direct contact with experts / design agencies:** Arvindbhai perceived that he was not allowed to meet experts / design agencies directly many times. GIAN has justified that it would always be advisable to avoid bias of innovators. Every innovators like their innovations very much but GIAN has responsibilities to convert those innovations in to marketable product. Hence, they take help of experts and design agencies. They should be able to work in unbiased manner to create marketable product out of Grass root innovations which is really tough job. So, they should not be disturbed by biased opinions of innovators.

- **Less / no fund for risky innovations:** Arvindbhai perceived that GIAN had not supported him for some risky innovations. GIAN has justified that they conduct competitive benchmarking through feasibility study with the help of their team, volunteers and summer interns. They take expert advice also. Then only, they take decision to support innovation. Hence, it is quite natural that innovations of low potential with high risk will not get support.

- **Technology Transfer mechanism was not effective:** Arvindbhai was not very much happy with the Technology Transfer mechanism. GIAN has justified this in convincing manner. The



Technology Transfer mechanism at GIAN is very much transparent with legal documentations in local language. Prior consent of innovators is always taken. But the process is very much challenging as each and every technology is new and unique. The valuation of technology is very difficult. Normally through negotiation with both the parties – innovators and the other company, the technology transfer takes place. GIAN act as a mediator between them. GIAN always try to protect the interest of the innovators. GIAN puts the details of the all innovations on websites of GIAN, NIF, Honey Bee Network and SRISTI for publicity. Even they put all their innovations in exhibitions etc also. Whenever there is any inquiry from any company, GIAN officials visit the company to check feasibility in terms of financial, marketing and all other business functions capabilities. They also check similarity of its present business with innovation and appropriate match making is done. The technology transfer can be of two types here: (1) Technology Transfer with Exclusive rights which priced more and (2) Technology Transfer with non Exclusive rights which priced less. GIAN does valuation of the technology innovations on the basis of market references which is quite difficult and challenging. After bargaining and negotiations, they come out with appropriate agreement.

- *No formal training for Grassroots innovators with poor educational background:* Arvindbhai perceived that he should have been provided formal training of business functions and soft skill. If he felt that the formal training would have made him more successful entrepreneur. GIAN has justified this also. GIAN has got limited fund and space which does not support formal training programs. For providing the formal training, they might have to design course curriculum etc. which may not be possible for GIAN with limited fund. In past they have tried but they could not get success as they have deal with grass root innovators with very low educational background who had not taken much interest. It is really difficult to convert Grassroots innovators in to Techno-entrepreneurs, claimed by the officials of the GIAN, so they basically focus on technology transfer. But, GIAN provides indirect training on all these aspects informally through continuous mentoring as mentioned in earlier section. Arvindbhai did not get any formal training from GIAN related to Business management functions, soft skills, technology and business plan but he got continuous mentoring from GIAN about all these aspects.

For Arvindbhai, challenges were always there when you were developing something new. Some major challenges he stated:

- Innovations to commercialization , time taken and rewards earned out of that – very slow
- Copy of innovations
- His own poor soft skills
- Fear of technology transfer as do not have proper past data for selling new technology
- Getting fund to support for innovations to commercialization
- *Obsolescence of technology*

For GIAN, it is difficult to sustain with limited funds the have got. They are running their organization from the interest of the initial corpus fund they have received from the Gujarat Government and NIF. It is really difficult to hire and to retain highly qualified skilled and capable people in management team due to low salary they can offer from limited fund. Even if they join GIAN, they leave after short period as good opportunities are available out side. Hence, only dedicated people, interested in the activities of GIAN, would be helpful but difficult to get this type of people. Getting better Grassroots innovations with market potential is always a challenge for GIAN. Getting effective volunteer or low cost support from networking institutions is also very difficult to support so many Grassroots innovations they come across.

Suggestions:

- Government should provide some more fund for establishing small workshop & laboratory and recurring expenses of the GIAN as it is unique institution to support Grass root innovations.

- Government should fund for establishing some more nodal centers of GIAN to speed up the process of wide spread Grass root innovation in vast country like India.

- GIAN and Government should come out with a mechanism to provide partial help from already established Government funded agencies like DIC (District Industries Centers), PDTC (Prototype Development and Training Centre), RTJG (Rural Technology Institute, Gandhinagar), CED (Centre for Entrepreneurship Development) and other academic technology institutions like NITs (National Institutes of Technology), IITs (Indian Institutes of Technology), IIMs (Indian Institute of Management), other local institutions. They can



provide help to GIAN in terms of Project support, Networking, Technology support, Mentoring, access to laboratories and workshops.

- For formal training to Grassroots innovators of GIAN, GIAN should tie up with EDII (Entrepreneurship Development Institute of India), CED (Centre for Entrepreneurship Development) and other management institutes. CED may be a better option as they conduct training in local languages also.

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Exhibit 1



Auto Air Kick Pump

Two & Three wheeler vehicles' population in India is over 30 million. The majority of the Indian villages are not connected with the local transport services provided by the state Government services. In a city area, to overcome the big headache of traffic problem, higher class people also prefer using two wheelers for daily transport. Rise in cost of fuel makes the use of four wheelers an expensive affair. All these factors favor the use of motor cycle or scooter, which is increasing day by day in rural and urban areas.

Tyre-puncture is a common problem in rural areas due to improper roads. The garage facilities are not available in the vicinity. Thus, the user faces the difficulties in repairing or checking the tyre failure. The motorcycle users can not keep pump available in the market because it is costly, big in size (impossible to keep in dickey) and heavy weight, as we see in the four wheelers. It is a problem in the city when garages are not open.

Arvindbhai Patel of Vanch village also faced the problem while daily up down from city. To overcome this daily hassle, the creative mind of Arvindbhai made him to find out a unique solution of all problems and invented the Auto Air Kick Pump.

About Innovation

It is a device to fill up the air in the tyre of scooter or any vehicle having kick start mechanism or auto start. The air generated inside the compressor of the two wheelers while kicking is utilized and transferred in to the tyre with the help of this Auto Air Kick Pump.

Distinguishing Features

- It is very cheap
- Handy & Portable
- Light in weight and compact in size
- Easy to use
- Flexible & self repairable
- Best alternative to spare wheel

(Source: GIAN's leaflet about the product)

Exhibit 2 Natural Water Cooler

In summers, cool water is a priceless commodity. A common man suffers the most, especially the one who is travelling and living in the rural areas. The earthen pots are ineffective beyond a certain temperature. The water coolers are

expensive, require high maintenance and run on electricity whose supply is erratic. The idea struck the innovator, Arvindbhai, when he was suffering from fever. The doctor asked his wife to put cold water bandage on his head to bring down the temperature. The current innovation of natural Water Cooler was inspired by this event. It is a device that cools water without using any kind of non-renewable energy sources such as electricity etc.

Features

- Environment friendly water cooler cools water naturally according to external temperature and humidity
- Does not require electricity for cooling therefore no recurring cost
- Copper base used for higher efficiency and medicinal values
- Two in one facility of cooler and water filter provides purely hygienic potable water
- Negligible maintenance cost and easily affordable
- Useful for installation at public places, institutions, offices and any public gathering places
- Available in variable capacities

(Source: GIAN's leaflet about the product)

Exhibit 3 Auto Sprayer (Kisan Mitra – Spray Pump)

All other conventional sprayers available in the market requires manual stroke on the lever to operate it, which requires / consumes human energy. Continuous stroking is essential for maintaining the required pressure for efficient operation of spraying. This process makes the operation, especially in big sprayers, very tiresome and due to that nobody is willing to use such kind of manually operated spray pump.

Arvindbhai Patel, a habitual innovator and active member of Honey Bee Network stays in search of new problems / puzzles. As a part of lateral learning process, GIAN raised this problem during discussion with him. Arvindbhai hit upon the unique idea of magnifying these jerks by using some additional weight and developed an innovative automatic sprayer. He used a spring and additional weight to magnify these jerks, which could be used to generate requisite pressure in the tank to spray the liquid of the tank.

Feature



- does not require any extra energy / torque for spraying
- Extremely energy efficient
- Easy to operate
- Extremely fine spray
- Easily repairable and requires least maintenance

(Source: GIAN's leaflet about the product)

- 2005, For Auto Sprayer, Government of Gujarat award for innovations
- 2006, For Innovative tong, President of India award for innovation

Exhibit 4 **Innovative tong**

In everyday life, one has to deal with hot plates and vessels regularly, mostly in kitchen. To avoid the high temperature, one either uses some insulators or some sort of gadgets, which are very expensive in the market. Tongs are one of the commonly used gadgets used of this proposes. It is basically a utensil-holding device inevitable in any kitchen, laboratory and mechanical workshop. Tongs available in the market are often clumsy and invariable unsatisfactory for the user. In most of the cases they are unreliable and cause accidents.

Arvindbhai Patel took the challenge for designing an innovative tong. He keenly watched the functioning of the common household tongs and discussed the problems with the potential users. From the feedback which he obtained about the conventional tongs, he designed a gadget, which is closest to their requirements. Also it is user-friendly and very cheap as compared to the conventional tongs available in the market.

Features

- Guide ways for proper alignment
- Jaws for better gripping
- Light weight
- No need to worry about the orientation of the tongs while using
- Easy to repair
- Durable and long life
- Two models for different applications

(Source: GIAN's leaflet about the product)

Exhibit 5 **List Awards**

- 1999, For Natural water Cooler, IIM A's director's trophy for Innovation
- 2001, For Natural Water Cooler, Trophy from Laghu Udhhyog Bharati, Gujarat
- 2002, For Auto Air Kick Pump, President of India award for innovation
- 2005, For Auto Sprayer, President of India award for innovation

